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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/528,940	03/23/2005	Timothy J Mousley	GB020164US	6581
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EXAMINER HU, RUI MENG				
ART UNIT 2618		PAPER NUMBER		
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/528,940

Applicant(s)

MOULSLEY ET AL.

Examiner

RuiMeng Hu

Art Unit

2618

Period for Reply -- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 15 April 2010.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-12, 14 and 15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-12, 14 and 15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/GS/US)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Response to Arguments

1. Applicant's arguments, see pages 1-3, filed on 04/15/2010, with respect to the rejection(s) of claim(s) 1, 10 and 12 under **Walton et al.** (U.S. Pub. 2003-0128658) in view of **Saito** (US Patent 4,989,262) have been fully considered and are persuasive. Therefore, the rejection has been withdrawn. However, upon further consideration, a new ground(s) of rejection is made in view of **Masak et al.** (US Patent 3987444).

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

4. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of

the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. **Claims 1, 10, 12 and 15** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Walton et al. (U.S. Pub. 2003-0128658)** in view of **Masak et al. (US Patent 3987444)**.

Consider **claim 1**, Walton et al. clearly disclose a method of operating a packet data transmission system (paragraphs 0002, 0247, 0250, 0043 and 0179, figures 8A and 8B) having a primary station (base station 104) having a plurality of antennas (antennas 824) and

at least one secondary station (terminals 106) having a plurality of antennas (antennas 852), where the primary station is configured for transmitting packet data on signal paths between pairs of primary and secondary station antennas;

the secondary station (106a) monitoring its radio environment (channel state information (CSI)) (paragraph 0248) and sending information about its radio environment to the primary station (base station 104) (paragraph 0249),

the primary station (base station 104) in response to this radio environment information adapting itself (paragraph 0250) and informing the secondary station

regarding a type of adaptation made (figure 2, step 236, paragraph 85, communicated to the terminals via a control channel); and

the secondary station (106a) configuring its receiver resources (antennas 852) for processing the received data and interference (figures 8A, 10B, paragraphs 0030, 0281; the interference component within the received vector signals received by antennas 852a-852r are subtracted/cancelled; the antennas 852a-852r are selected ones of the plurality of antennas of the mobile terminal 106a; or paragraph 0030 and figure 8A recited "For the downlink, the number of, receive antennas 852 at a communicating terminal 106a may be equal to or greater than the number of transmit antennas at the base station 104 (i.e., $N_R > N_T$). For such a terminal, the number of spatial subchannels is limited by the number of transmit antennas at the base station." Thus a subset of antennas 852 are selected, or all of antennas 852 are selected if $N_R = N_T$).

However Walton et al. fail to mention choosing selected ones of the plurality of its antennas for receiving interference signals for interference cancellation.

In the same field of endeavor, Masak et al. disclose a receiver comprising a plurality of antennas (figure 1, antennas 12) for interference cancellation, wherein choosing selected ones (figure 1, switches 23a-23d for choosing selected antennas 12) of the plurality of its antennas for receiving interference signals for interference cancellation (Abstract, figure 1, column 2 line 41-column 3 line 7).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Masak

et al. into the art of Walton et al. as to remove interference signals received from interference sources of other angular regions within the coverage area.

Consider **claim 10**, Walton et al. clearly disclose a packet data transmission system (paragraph 0002, figures 8A and 8B) comprising: a primary station (base station 104) having a plurality of antennas (antennas 824), signal transmitting (822) and receiving means (822) and means for adapting itself in response to a received signal from a secondary station (terminal 106a) (paragraphs 0248-0250), and means for informing the secondary station regarding the type of adaptation made (figure 2, step 236, paragraph 85, communicated to the terminals via a control channel), and at least one secondary station (terminal 106a) having signal transmitting and receiving means (854), a plurality of antennas (antennas 852), means for monitoring its radio environment and for transmitting a signal including information about its radio environment (paragraph 0248), and means for configuring its receiver resources for processing data signals received from the primary station after adaptation and interference (paragraphs 0247-0250, 0043 and 0179).

However Walton et al. fail to mention choosing selected ones of the plurality of its antennas for receiving interference signals for interference cancellation.

In the same field of endeavor, Masak et al. disclose a receiver comprising a plurality of antennas (figure 1, antennas 12) for interference cancellation, wherein choosing selected ones (figure 1, switches 23a-23d for choosing selected antennas 12) of the plurality of its antennas for receiving interference signals for interference cancellation (Abstract, figure 1, column 2 line 41-column 3 line 7).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Masak et al. into the art of Walton et al. as to remove interference signals received from interference sources of other angular regions within the coverage area.

Consider **claim 12**, Walton et al. clearly disclose a secondary station (terminal 106a) for use in a packet data transmission system having a primary station with a plurality of antennas and, in response to uplink signals may adapt a transmission scheme, the secondary station (paragraph 0002, figures 8A and 8B) comprising: signal transmitting and receiving (854) means, a plurality of antennas (852) and means for monitoring its radio environment and for transmitting a signal including information about its radio environment (paragraph 0248), means for receiving information regarding the type of adaptation made by the primary station (figure 2, step 236, paragraph 85, communicated to the terminals via a control channel); and means for configuring its receiver resources (852) for processing received data signals and interference (paragraphs 0247-0250, 0043 and 0179).

However Walton et al. fail to mention choosing selected ones of the plurality of its antennas for receiving interference signals for interference cancellation.

In the same field of endeavor, Masak et al. disclose a receiver comprising a plurality of antennas (figure 1, antennas 12) for interference cancellation, wherein choosing selected ones (figure 1, switches 23a-23d for choosing selected antennas 12) of the plurality of its antennas for receiving interference signals for interference cancellation (Abstract, figure 1, column 2 line 41-column 3 line 7).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Masak et al. into the art of Walton et al. as to remove interference signals received from interference sources of other angular regions within the coverage area.

Consider **claim 15 as applied to claim 1**, Walton et al. as modified disclose determining characteristics of channel transfer functions between interference sources and the secondary station antennas (Walton et al., paragraphs 292, 295, Channel Status Information includes characteristics of interference signals).

Claims 2-9 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Walton et al. (U.S. Pub. 20030128658)** as modified by **Masak et al. (US Patent 3987444)** in view of **Gore et al. (U.S. Patent # 6,917,820 B2)**.

Consider **claim 2, as applied to claim 1**, Walton et al. as modified fail to disclose wherein the secondary station (terminal 106a) recommends to the primary station (base station 104) how it should adapt itself.

In the same field of endeavor, Gore et al. clearly disclose a communication terminal (figure 1, receiver 32) recommends to the primary station (figure 1, transmitter 30) how it should adapt itself (Based on the information computed by the computation unit 320, the switch 303 selects the optimal set of antennas) (column 4 lines 30-63).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Gore

et al. into the art of Walton et al. as modified as to use feedback CSI to select the optimal set of antennas for improving performance of wireless communication.

Consider **claim 3, as applied to claim 2 above**, Walton et al. as modified fail to disclose wherein the secondary station recommends that the primary station use a particular subset of antennas for transmitting packet data.

In the same field of endeavor, Gore et al. clearly disclose a communication terminal (figure 1, receiver 32) recommends to the primary station (figure 1, transmitter 30) use a particular subset of antennas for transmitting packet data (Based on the information computed by the computation unit 320, the switch 303 selects the optimal set of antennas) (column 4 lines 30-63, column 5 lines 42-50).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Gore et al. into the art of Walton et al. as modified as to select the optimal set of antennas for improving performance of wireless communication.

Consider **claim 4, as applied to claim 2 or 3 above**, Walton et al. as modified fail to disclose wherein the secondary station recommends the maximum desired number of receivable transmission antennas to be used by the primary station.

In the same field of endeavor, Gore et al. clearly disclose characterized in that the secondary station recommends the maximum desired number of receivable transmission antennas to be used by the primary station (Based on the transmitter capacity and the information computed by the computation unit 320, the switch 303

would select the maximum desired number of antennas) (column 1 line 62-column 2 line 2, column 4 lines 30-63, column 5 lines 42-50).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Gore et al. into the art of Walton et al. as modified as to select the optimal set of antennas for improving performance of wireless communication.

Consider **claim 5 as applied to claim 2 or 3**, Walton et al. as modified disclose wherein the secondary station recommends the transmission format to be used by the primary station (paragraph 287, based on the feedback CSI, the transmitter selects proper data rate and the coding and modulation scheme).

Consider **claim 6 as applied to claim 2 or 3**, Walton et al. as modified disclose wherein the primary station adapts itself as recommended by the secondary station (paragraph 43, the receiver can determine which subset of transmit antennas should be used for data transmission and provide this information via a feedback channel, also paragraph 287, based on the feedback CSI, the transmitter selects proper data rate and the coding and modulation scheme).

Consider **claim 7 as applied to claim 1, 2 or 3**, Walton et al. as modified disclose wherein the secondary station determines the resources to be used for receiving packet data and the resources to be used for interference cancellation, and wherein a number of interference sources which can be cancelled by a linear combination of antenna outputs is equal to the number of receiver antennas minus the

number of signals to be received from the primary station (figure 10b, paragraphs 278, 279).

Consider **claim 8 as applied to claim 1, 2 or 3**, Walton et al. as modified disclose wherein the secondary station monitors the transfer function of the paths between the primary and secondary stations antennas (paragraphs 248, 295).

Consider **claim 9 as applied to claim 1, 2 or 3**, Walton et al. as modified disclose wherein the information about the radio environment of the secondary station includes characteristics of the interference present at one or more antennas of the secondary station (paragraph 292).

Consider **claim 11 as applied to claim 9**, Walton et al. as modified disclose wherein the monitoring means comprises means for determining the transfer functions of the radio paths between the primary station and secondary stations (paragraph 295).

Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over **Walton et al. (U.S. Pub. 20030128658)** as modified by **Masak et al. (US Patent 3987444)** in view of **Matsue et al. (U.S. Patent 4736455)**.

Consider **claim 14 as applied to claim 12**, Walton et al. as modified disclose wherein the secondary station determines the resources to be used for receiving packet data (antennas 852) and the resources to be used for interference cancellation (interference canceller 1070).

However Walton et al. as modified fail to disclose wherein a number of interference sources which can be cancelled by a linear combination of antenna outputs

is equal to the number of receiver antennas minus the number of signals to be received from the primary station.

In the same field of endeavor, Matsue et al. disclose a receiver comprising a plurality of antennas, (figure 1, Abstract) wherein a number of interference (i.e. 1) sources which can be cancelled by a linear combination (summer 11) of antenna outputs is equal to the number of receiver antennas (i.e. 2) minus the number of signals to be received from the primary station (i.e. 1).

Therefore, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to incorporate the selection technique taught by Matsue et al. into the art of Walton et al. as modified as to improve interference cancellation.

Conclusion

Any response to this Office Action should be **faxed to (571) 273-8300 or mailed**

to: Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

Any inquiry concerning this communication or earlier communications from the examiner should be directed to RuiMeng Hu whose telephone number is 571-270-1105.

The examiner can normally be reached on Monday - Thursday, 8:00 a.m. - 5:00 p.m., EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Edward Urban can be reached on 571-272-7899. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/RuiMeng Hu/
R.H./rh
June 18, 2010

/Edward Urban/

Supervisory Patent Examiner, Art Unit 2618